The Impact Of The Digital Economy And New Infrastructure On China's Economic Development

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Abstract. With the rapid growth of digital technology and the advent of the epidemic and post-epidemic era, digital economy has become a vital force driving China's monetary growth and transformation and modernizing. The digital economy and new infrastructure are two important directions in current China's economic development. Using the newly implemented infrastructure policies released by municipality governments in China from 2018 to 2022 as a data source, the concept of new progress, driven by novel technologies, and built on digitized networks of information, is used to provide a source of power for further economic development. This paper investigates the positive and negative effects of the mathematical economy on economic growth using the Cobb-Douglas production function, Keynes-Hicks social welfare function, and Differential pricing model. One way that the digital economy might advance is by lowering transaction costs, increasing economic growth rates and total factor productivity, creating new employment opportunities, raising individual income levels, improving social services and public administration, raising social welfare levels, and further promoting economic development. On the other hand, new infrastructure includes digital infrastructure, smart manufacturing, new energy, and transportation infrastructure. The construction of these infrastructures can promote industrial upgrading and the adjustment and optimization of industrial structures. The transformation of traditional service and manufacturing industries into digitized online industries will ultimately lead to a more transparent and efficient overall economy. Even if the new infrastructure and digital economy can cause problems such as unfair competition and privacy breaches, the combination of them can lead to a win-win situation for economic development in China.

Keywords: Digital economy; new infrastructure; Economic growth.

1. Introduction

1.1. Research Background

The online economy has emerged as a new source of growth for China's economy with the advancement of technological devices and the Internet. Since the outbreak of the COVID-19 pandemic, technology has evolved rapidly, giving rise to a series of cloud economies that have accelerated the digital transformation of industries and businesses. For example, the popularization of telecommuting and online education, e-commerce platforms, online entertainment, and smart logistics are all areas that have received more attention and investment, driving the growth of the internet-based economy. Meanwhile, new infrastructure is also a significant economic development strategy proposed by the Chinese government in recent years, from its proposal in 2018 to its focus on development in 2020 to its takeoff in the epidemic and post-epidemic era in 2022, which aims to promote economic trunaround, upgrading and enhancing development through the upgrading of technology and infrastructure. In this context, studying the influence of the online economy and modern infrastructure on the financial progress of China is of great significance for an in-depth understanding of the trends and characteristics of the current Chinese economic development. First of all, the deepening of the online economy and new infrastructure may have far-reaching impacts on China's economic structure, growth model, industrial layout, etc., so in-depth research on their impacts is needed. Furthermore, the creation of them involves a number of fields and industries and requires interdisciplinary research methods and perspectives, which can help to promote exchanges and cooperation between academia and practice. Finally, construction of the new infrastructure and

digital economy also faces a series of challenges and problems, such as data privacy and cybersecurity, which require researchers to explore their solutions and policy support in depth. Therefore, studying the influence of the computerized economy and new infrastructure relating to China's growth in commerce has both important practical significance and academic value.

1.2. Literature Review

There have been multiple studies concerning new infrastructure both domestically and internationally with the digital economy. In recent years, domestic scholars have also been gradually focusing on their impact on economic development. For example, through the research methods of Mesomeric effect and Heterogeneity analysis, Xing GAO (2023) found that the flourishing of the electronic economy significantly promotes common wealth and manufacturing processes upgrading [1]. Guangshao Li (2023) gathered data collected by urban panel from 30 provinces in China from 2014 to 2019 to measure the mechanism of the role of new infrastructure investment in the improvement of the quality of the economy by means of factor analysis methods. This culminates in the recommendation that different administrative regions should formulate feasible policies tailored to their local conditions in utilizing new infrastructure to enhance the quality of their economies [2]. Lu Zhou, Fan Zhang, and Jingwen Wang (2021) worked together to cultivate digital technology and its derivatives of the digital economy has continued to expand, China's added value in the digital marketplace went up from 2.6 trillion in 2005 to 35.8 trillion in 2019, and the computerized economy accounted for a share of the GDP also soared from 14.2% to 36.2% [3]. Against the backdrop of both epidemic shocks and opportunities, the digital economy has resulted in the rapid growth of online healthcare, online retail, and online offices. Hence, in the context of the overall downward trend of the global economy, China has successfully accelerated economic recovery and development and maintained the pace of economic order and stability through the establishment of the digital economy. Overseas scholars have also done some research on the digital economy. S S Veleva and A I Tsvetanova (2020) analyzed the advantages and disadvantages of digital marketing. Among the pros are the creation of precondition and advantageous circumstances for the fruitful growth of virtual organizations. Thanks to digital technology, the system recommends products and services of greater interest to people based on personal preferences, which is convenient and time-saving. Meanwhile, it also has many drawbacks, such as digital marketing's high reliance on technology and a company's online reputation being damaged by a few negative feedbacks [4]. Kaewkamol Pitakdumrongkit (2023) pointed out that Southeast Asian countries especially ASEAN, which cooperates with China, also realized the usefulness of the online economy for ASEAN economies. The online economy and online commerce were prominent drivers of international exports and growth, and the countries of Southeast Asia should join forces to create an e-society and e-government [5].

1.3. Research Content And Significance

The major investigate of this essay is focused on the digital economy and contemporary infrastructure. The research on them has been relatively mature in China. Scholars have analyzed the different characteristics of its distribution to different spaces in China and explained the rationale for its huge boost to the Chinese economy. Moreover, it is expounded on the impact of these two policies on specific sectors, such as tourism and the new energy vehicle industry. In recent years, foreign scholars' knowledge concerning the digital economy and the huge role it plays in China's economy has gradually increased in fervor. However, few studies have been conducted on China's new infrastructure policy. New infrastructure and the online economy are mutually reinforcing. The digital economy can provide the new infrastructure with the ability to digitally transform and innovate, while the new infrastructure can provide the digital economy with the technological foundation, scenarios, and applications, including smart city construction, smart manufacturing, and digital healthcare. Therefore, we need to strengthen the research and attention to the new infrastructure policy and to further understand its pros and cons for economic improvement. This essay first introduces the specific content of the online economy and new infrastructure, then analyzes its facilitating effect on

economic development, and then discusses its negative effect on economic development, and finally provides appropriate solutions to compensate for its disadvantages. Then it discusses its negative effects on economic growth and finally provides appropriate solutions to make up for its disadvantages and further promote economic improvement.

2. The Positive Impact Of The Digital Economy On China's Economic Development

The incorporation and utilization of technologies for communication and information as well as the digital transformation of all factors are significant factors contributing to the online economy, which is a novel economic constitute that emphasizes the importance of data resources as key components, the modern era networks of data as the main carriers, and optimized effectiveness and equitable distribution. According to the Digital China Development Report (2022), the digital market in China will develop nominally by 10.3 percent yearly in 2022 to reach 50.2 trillion yuan, placing second in the entire globe in terms of overall volume, and accounting for 41.5 percent of GDP [6]. The deepening of China's digital economy shows a spatial distribution pattern in which the eastern part of the country is developed, the central and western regions are lagging, and the northeastern region is developing slowly, which is positively correlated with the economic development of each region. From 2012 to 2018, the growth rate of the online economy index was high in all regions, especially in the western and central regions, amounting to more than 20 percent. After 2018, the growth rate of the Digital Economy Index slowed down. 2021 even saw negative growth in some regions, showing the strong negative externalities of the epidemic on the digital economy [7]. To begin with, the inventive force behind the productivity of all factors is the digital economy. It has significantly boosted the output of society through sophisticated innovations and applications, including blockchain and cloud computing [8]. Furthermore, the digital economy can increase efficiency, break down geography and thus limit the expansion of markets, and promote sustainable development, as exemplified by the sharing economy, which reduces carbon emissions. Ultimately, the impact series had a positive effect, leading to the rapid breakthrough of China's economy. The role of the digital economy on the economy will be analyzed by a number of functions and models. First and foremost, the Cobb-Douglas production function is a function used in economics to describe the production process, and it is often used to study the effects of factors of production on output. Thus, it can be used to illustrate the effect of electronic economy on the improvement of the economy. The general form of the Cobb-Douglas production function is:

$$Y = A*K\alpha*L1-\alpha \quad (1)$$

Where a represents total factor productivity, Y for output, L for labor, K for capital, and α denotes the elasticity of capital in production. The widespread use of digital technologies can increase the efficiency of factors of production, thereby improving productivity and total factor productivity. For example, in the digital economy, companies can use electronic technologies to improve productivity, such as automated production lines. These technologies can maximize productivity and lower production expenses. In addition, the digital economy can also provide more factors of production, such as easier access to means of production and labor resources through online sales and logistics and distribution. Accordingly, replacing the factors of production in the Cobb-Douglas production function with those of the digital economy yields a production function of the following form:

$$Y = A*D\alpha*E1-\alpha \quad (2)$$

Where D denotes the degree of adoption of electronic technology and E denotes the labor and other factors of production provided by the digital economy. From the above production function, it is evident that the onset of the online economy can contribute to the increase of total factor productivity, which in turn increases the economic growth rate. The incorporation of digital technology can boost the efficiency of factors of production and increase the supply of factors of production, thereby

increasing productivity and total factor productivity. Thus, the development of the digital economy can contribute to economic growth and improve economic efficiency and productivity.

3. The Advantages Of New Infrastructure For China's Economic Growth

New Infrastructure is a new type of infrastructure development policy proposed by the Chinese government in 2018, which refers to new types of infrastructure represented by artificial intelligence and the Internet of Things, which are essential infrastructures for digitizing information. Building of new infrastructure, as opposed to conventional facilities, has richer implications, encompasses a larger area, better reflects the traits of the new economy, and can better support China's economic transition and modernization. The promotion of new infrastructure has injected new momentum into our economic growth. The country's GDP covers consumption, investment, government purchases, and imports and exports. Investment, especially long-term and stable infrastructure investment, not only leads to the synergistic development of upstream and downstream industrial chains but also provides tens of thousands of employments, which is a critical driving force for achieving economic growth [9]. The notion of new infrastructure was also featured for the first time in the Chinese government's 2020 work report in order to mitigate the simultaneous impacts of the new coronary pneumonia and the market slump [10]. The construction of new facilities will establish digital infrastructure, including high-speed broadband, 5G networks, data centers, etc., thus promoting the deepening of a digital economy, improving economic efficiency, and facilitating industrial upgrading and transformation. Besides, it can strengthen the country's informatization capacity, improve the level of informatization, promote the growth of the informatization industry, and optimize the allocation of social resources. Analyzing some specific industries, on the one hand, in the new energy vehicle market, experts confirmed that the construction of new energy vehicle charging piles as a new type of infrastructure can promote economic growth by studying the fixed effects model regression of IVA [11]. On the other hand, new infrastructure creates a range of new channels and styles for digital tourism, offering new growth potential. The COVID-19 pandemic in 2020 has hit the tourism field hard, especially the traditional hospitality sector that used to rely on crowd spending. However, emerging sectors such as cloud vacations based on online businesses are growing rapidly in China [12]. Digital tourism relies on digital technology to manage tourism-related content, provide digital cultural services, and facilitate China's economic recovery in the post-pandemic era. There is a function that demonstrates the role of national policies on the economy. It is the Keynes-Hicks social welfare function proposed by Keynes and Hicks in the 1930s and commonly used to assess the impact of policy changes on the level of social welfare. The general form is:

$$SWF = U (C1, C2..., Cn) \quad (3)$$

Where SWF stands for total social welfare, C1, C2..., Cn stands for personal consumption expenditure and U stands for social welfare function. The new infrastructure facilitates the construction of intercity high-speed railroads and charging piles for new energy vehicles, improving the convenience of public transportation. Furthermore, it can create new employment opportunities, raise the level of personal income, and further improve social welfare. As a result, the form of the function shifts under the New Infrastructure Policy:

$$SWF = U (D1, D2..., Dn) \quad (4)$$

Where D1, D2..., Dn denote the services and conveniences brought about by various new infrastructures. As can be observed from the social welfare function mentioned above, building new types of equipment can enhance public services and management, advance social welfare, and thereby promote people's quality of life and welfare.

4. The Negative Impact Of The Digital Economy And New Infrastructure On China's Economic Development And Measures To Address It

While the online economy and modern infrastructure policies can have many positive effects on China's economy, they inevitably have drawbacks as well. One of the most serious hazards is the serious leakage of user information. Personal data such as cell phone numbers and home addresses, which are supposed to be the most basic private information about a person, can be easily accessed by data platforms. For example, many websites show users their popularity and rewards to gain their trust but actually expect users to quickly disclose their personal information [13]. Some companies may use people's information to investigate preferences, but the scary part is that some unscrupulous websites may identity steal and use other people's identities for fraudulent activities. Websites can also disclose sensitive information such as personal bank accounts and credit card numbers, which can lead to financial losses, such as stolen bank cards and misuse of credit cards. Taking radio and television stations in the era of integrated media as an example, it faces a variety of security problems different from those of traditional media, specifically including cyber-attacks and hacking, and the spread of false information. Their solution is to strengthen the audit and management of program content to ensure the legality and legitimacy of program content, and to strengthen technical research and management measures to protect user privacy and security [14]. People should pay attention to the protection of their privacy, enterprises should establish a perfect security system and strengthen management and supervision, and the government should set up relevant laws and regulations and crack down on illegal behavior. Another disadvantage is that the breakthrough of the online economy can lead to unfair competition among businesses. Inequitable rivals in the market may result from the expansion of the digital economy. The growth of the online economy has brought with it a wealth of data and technological advantages that can be exploited by some businesses to give them an unfair competitive advantage in the marketplace. Take the example of the differential pricing model which is a market pricing strategy that refers to the use of different prices across markets or customers. Due to differences in data collection and analytics capabilities, some large digital economy companies can better understand user needs and behaviors, resulting in more accurate data and more refined and differentiated pricing, which smaller companies cannot do. This situation allows large companies to take advantage of data to gain more market share. To sum up, differential pricing models can be used to demonstrate unjust competitive advantage in the digital economy. Digital economy firms can use data and technology to their advantage to develop more personalized pricing strategies, thereby creating an unfair competitive advantage in the marketplace and competitive pressure on other corporations. Therefore, the government should establish a fair competition mechanism, strengthen industry-specific and competitive regulation of digital enterprises, create a good market environment, strengthen the maintenance of market order, and promote fair competition in the digital economy. China still lags behind in terms of the latest innovations, particularly in areas like transistors and other essential technologies. Nevertheless, the maximum level of corporate intelligence is mostly determined by the amount of digital technology [15]. Therefore, it is necessary to upgrade digital technology and unite with the real economy for joint development. The combination of the online economy and the real economy allows for synergistic economic development. The digital economy can provide more efficient production methods and distribution channels, while the real economy can provide more practical products and services. The combination of the online economy and the real economy can improve the efficiency and quality of production, and finally build a modern infrastructure system of the "Internet of Everything".

5. Conclusion

5.1. Key Findings

Digital economy and new infrastructure are important strategic directions for China's current economic development, and their influence on China's economic development has gradually emerged.

The expanding scope of the online economy supports economic improvement and outstanding development, as well as the development of new-generation information technologies such as the Internet, information and communications, and artificial intelligence. Meanwhile, the digital economy has given new impetus to growth and innovation in China's economy. First of all, the deepening of the digital economy helps to foster the evolution and upgrading of China's economy. With the continuous ongoing modernization of old sectors and the emergence of new businesses, the digital economy has become a new engine to propel the Chinese economy forward. The online economy plays an essential role in improving economic efficiency, driving economic growth, and promoting employment. Secondly, the online economy also promotes the breakthrough of new-generation information technologies such as the Internet, information and communications, and artificial intelligence. The improvement of the online economy has facilitated the widespread use of the Internet and digitization technologies and promoted the innovation and deepening of information technology. Finally, the online economy has also injected new impetus into the innovation of the Chinese economy. With the breakthrough of the digital economy, more and more new forms of business, new products, and new business models have emerged, injecting new impetus into the innovation and development of China's economy. New infrastructure is an important economic development strategy put forward by the Chinese government to promote economic transformation and high-quality improvement through technological and infrastructural upgrades. The deepening of new infrastructure not only helps to improve the quality and efficiency of infrastructure but also helps to promote the improvement of new energy, intelligent transportation, digital cities, and other areas. The deepening of new infrastructure will also help promote sustainable and green improvement of China's economy. First, the breakthrough of modern infrastructure helps improve the quality and efficiency of infrastructure. Modern infrastructure involves a number of areas, including 5G networks, artificial intelligence, and smart transportation, which will help improve the quality and efficiency of infrastructure. Secondly, the progress of new infrastructure will help promote the deepening of new energy, intelligent transportation, and digital cities. Finally, the progress of modern infrastructure will also help promote sustainable and green improvement of China's economy. There are pros and cons to the online economy and modern infrastructure, but the combination of them can be a win-win for economic growth.

5.2. Future Studies

In the face of some of the current shortcomings of the online economy and new infrastructures, the authorities needs to strengthen the regulation and management of cybersecurity, formulate relevant laws and regulations, establish a system for cybersecurity and privacy protection, strengthen technological research and development and talent training, and improve social awareness and quality. Bolster the buildup of digital infrastructure, and encourage adoption and use of the online economy, and narrow the digital divide. Ultimately, it will promote the integration of the online economy and the traditional industrial economy and realize the synergistic deepening of man and machine. In the future, the breakthrough of the online economy and new infrastructure will further enhance China's international competitiveness. They will also promote the competitiveness of Chinese firms and industries in the global market and enhance China's voice in the global digital economy. The improvement of new infrastructure will enhance China's infrastructure level and technological strength and improve China's competitiveness in the international market.

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